ENGINEERING EDUCATION

Bulletin of the

Society for the Promotion of Engineering Education

Published under the supervision of the Publication Committee:

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VOL. XIV LANCASTER, PA., NOVEMBER, 1923. No. 3

TABLE OF CONTENTS.

The Carnegie Grant of $108,000 104
Acceptance of Director of Investigations, W. E. Wickenden 105
What Can the Society Do? Chas. F. Scott, Chairman, Board of Investigation and Coördination 106
The Engineering Teacher. H. S. Boardman, Vice-President 109
Large-Scale Production as a College Study 111
The Content of a Drawing Course. Thos. E. French 114
Elementary Civil Engineering. J. W. Jourdan 121
The English Department 124
Reactions on the Cornell Meeting 126
Report of Progress of Committee Number 20, on the Standardization of Technical Nomenclature 135
College Notes 142
Society Notes 147
New Members 147
Applicants for Membership 148

CARNEGIE CORPORATION
OF NEW YORK
522 FIFTH AVENUE
NEW YORK

OFFICE OF THE PRESIDENT

October 3

Professor C. F. Scott, Chairman,
Board of Investigation and Co-ordination,
Society for the Promotion of Engineering Education.

Dear Professor Scott:

It gives me great pleasure to inform you that at the meeting of the Carnegie Corporation held yesterday the following resolution was adopted:

> Resolved, That the sum of $108,000 be, and it hereby is, set aside for the purpose of making possible a study of engineering education under the direction of the Society for the Promotion of Engineering Education; that of this sum the following amounts be, and they hereby are, made available to the Society for the Promotion of Engineering Education:
>
> $24,000 during the present fiscal year
> 12,000 during the fiscal year 1924
>
> with the understanding that if, in the judgment of the Executive Committee, substantial progress shall have been made in this study by January 1, 1925, the balance of the $108,000. will be made available to the Society as follows:
>
> $24,000 additional during the fiscal year 1924
> 48,000 during the fiscal year 1925

Sincerely yours,

F. P. Keppel

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W. E. WICKENDEN
ASSISTANT VICE PRESIDENT

November 17, 1923.

MR. F. L. BISHOP, *Secretary,*
Society for the Promotion of Engineering Education,
Pittsburgh, Pennsylvania.

Dear Mr. Bishop: This is to acknowledge the formal notification of my appointment as Director of Investigations of the Society for the Promotion of Engineering Education as set forth in your letter of November 13, 1923, and to confirm my acceptance of this appointment on the terms proposed therein. It is my expectation to give this work half my time until the end of 1923 and my full attention after that date.

It has not been easy to reach a decision on your offer, because of the congenial setting and great opportunities afforded by my recent work. I doubt if I should have considered making a change to another business connection. A careful consideration of the project developed by the Board of Investigation and Coördination has convinced me that it is strategic in its importance, that it is feasible, and that the conditions in and out of the colleges are favorable to its success. Being equally convinced that my interest in education exceeds my interest in business, the opportunity to have an active share in the work has come to have a strong appeal to my interest and enthusiasm.

In seeking counsel from men in active business and professional life I have been impressed by their deep concern in the problems of engineering education. The underlying plan of this project—that the whole group of engineering colleges should unite for self-investigation and should seek the active coöperation of industrial, professional, educational and governmental agencies in appraising and reshaping their objectives and methods has seemed to them a unique and significant plan. Whatever progress and success comes out of it will be closely watched and will have a marked influence on other educational groups.

For the largest success of the project it seems essential that it should continue to be, as it has been, a movement of, by and for the colleges themselves. I shall endeavor to make this my policy and my program.

Yours very truly,
WM. E. WICKENDEN.

WHAT CAN THE SOCIETY DO?

BY CHAS. F. SCOTT,

Chairman, Board of Investigation and Coördination.

"What can the Society do in a comprehensive way to develop, broaden and enrich Engineering Education," the question which the Council of the Society referred to a specially appointed development committee at the annual Convention a year ago last June, has been answered as follows.

The Society is undertaking a comprehensive study of engineering education. (Note that the initial query was *"What can the Society do,"* and not, what can somebody do for it!)

It has created a Board of Investigation and Coördination under whose general direction the undertaking is to be conducted. The members of the present Board are: M. E. Cooley, Michigan; John H. Dunlap, Secretary, A.S.C.E.; D. C. Jackson, Massachusetts Institute of Technology; F. W. McNair, Michigan College of Mines; P. F. Walker, University of Kansas; C. F. Scott, Yale University, Chairman. Dean F. L. Bishop is Secretary of the Board. Two non-engineering educators are to be added.

The Carnegie Corporation has set aside $108,000 to provide $24,000, $36,000 and $48,000 in three successive years for a study of Engineering Education by the S. P. E. E. The general plan and the field for initial study was presented to the annual Convention at Cornell and received the hearty endorsement of the Society. The correspondence preliminary to the grant of funds is published in the September issue of "Engineering Education" in the Secretary's Report. The following sentences indicate the character of the studies to be undertaken now and the part the schools are to take:

"It is therefore proposed that the investigations of this Society be directed to a study of the objects of engineering education and the fitness of the present day curriculum for preparing the student for his profession. It will study the process by which the curriculum of fifty years ago has come to its present form; it will seek to set forth the nature and the

weakness of the curriculum as at present administered; and it will indicate such modifications or developments as would seem to make for a sound, well-balanced, and fruitful course of study for engineering students.

"The Director shall organize committees in the faculties of as large a number of engineering schools as may be practicable, who shall coöperate with the committee and with the Society for the Promotion of Engineering Education in the prosecution of this study."

Mr. W. E. Wickenden has been appointed Director of Investigations. He began his work on a part time basis the middle of November and expects to have his full time available on or soon after January 1.

The Engineering Societies are appointing counsellors to advise and coöperate with the Board.

Office space has been acquired in the Engineering Societies' Building, 33 West 39th Street, New York.

Members of the Board, accompanied by the Director have had conferences with Dr. Pritchett and with Dr. Keppel, the new President of the Carnegie Corporation, formerly Dean at Columbia. Both indicated their conviction as to the importance of what we are undertaking and their active interest in it. They said that while the full responsibility for carrying out the work lay in our hands, yet they would be glad to be kept in touch with it and informed as to its progress.

The Joint Conference Committee of our Society and the National Industrial Conference Board is expected to provide a means by which our activities can maintain relations with the industries. The paper presented by Mr. O. S. Lyford at our last Convention, soon to appear in ENGINEERING EDUCATION sets forth the relation between the Industries and Engineering Education.

The U. S. Bureau of Education is now compiling data on present engineering curricula which has been planned as a part of our new project.

Two years ago the Foreword of the incoming President proposed that the Society should undertake its problems in

a larger way than its organization and its income permitted. In seeking counsel he was told "You will have more difficulty in finding the man than the money, but first of all have you got the schools to back you?" Efforts were directed to the schools; a year later it was felt that they were ready and funds were sought in a conference with Dr. Pritchett on December 8, 1922. On October 30, 1923, the grant was made and on November 8, 1923, W. E. Wickenden, who had been chosen at the Cornell Convention, and who had held the matter under advisement, was formally appointed, by the Board, Director of Investigations.

That is the story to date; but it is merely the introduction; it has taken two years to do what the too expeditious President hoped might be accomplished in two months.

A unique feature of the present project is the active participation by the schools themselves instead of having some outside agency diagnose difficulties and prescribe remedies. Dr. Pritchett from his viewpoint of wide experience in such matters comments as follows:

"I am also convinced of the great significance of the plan through which the faculties of a number of engineering schools will coöperate, through committees, with the Society for the Promotion of Engineering Education in the prosecution of this study. Such coöperation will mean not only that the faculties of these schools will be in close touch with the study and will take part in the conclusions reached, but it will also help to create among teachers of engineering a hospitable attitude of mind toward the report of the Committee."

Mr. Carnegie's influence on engineering continues. He gave the funds which produced the headquarters of the engineering profession, a magnificent, dignified and inspiring building which is bringing the engineering profession into a coöperating unity, and now, made possible by the funds which he established, the Board of Investigation and Coördination is located in that building, and will direct the steps which may elevate the whole plane of the profession on its educational and inspirational side.

THE ENGINEERING TEACHER.

BY H. S. BOARDMAN,

Vice-President of the Society.

Does it pay to be a teacher? How many times have we asked this question during the time we have been teaching? And what has been the answer? In most cases nothing definite without a careful analysis of our particular problem. How many of us deliberately prepared for the teaching profession? How many drifted into it? I should like to have a record of each engineering teacher in the country, together with his honest answers to certain questions. It would make interesting and instructive reading.

It has always appeared to me that a large majority of engineering teachers grew like Topsy. Too much training at the expense of the students and too little attention to the pedagogical atmosphere has, in the past, been in evidence in the development of our engineering faculties. Engineering experience is necessary before a young graduate can develop into a successful teacher. How many successful engineers, however, have been failures as teachers? I know of a few and so do you. Teaching is just as much of an art and needs just as much study for its success as do many of the big engineering problems. If we are to build a bridge or create a machine we do not rush at it from a hit or miss attitude; we create it logically. How many engineering teachers are created pedagogically?

In the past I have heard certain engineering teachers spoken of as having been failures as engineers and so drifted into teaching. If this is true it is deplorable. I can but feel that such a situation is at least not on the increase at the present time.

What measures success? Is the man who piles up gold

successful? The world is too likely to apply that measure and answer in the affirmative. It is true that gold is necessary as a medium of exchange in order to supply the necessities of life, but surely the man who has felt an overwhelming interest in his work and is carried away with the love of doing something for his fellowmen realizes that gold is only secondary. Unless such an interest is evident the fullest success cannot be attained, and this is especially true in the profession of teaching. We hear much in the present day of the "go-getter." The term cannot apply to one unless he has this spirit. The old adage that opportunity knocks but once at our door has been sadly mutilated. Opportunity is always with us. It comes and goes in so many different guises that one may grasp it at all times and places if the real desire exists.

The teacher of engineering is not the same kind of animal as the old time college professor. He has, however, had to live down this reputation and create a reputation of his own. It has been a hard job but the end is in sight.

Much has been written about ideals. Boiled down to its lowest terms the accepted theory which works in practice is to take for an ideal that which is so high that we never expect to attain it. If we do reach our ideal then another higher one must be found if we are to go upward and onward. The teacher who is successful must apply this constantly or he is very soon relegated to the shelf of the before-mentioned old timer. Please do not feel that I am poking fun at the old time college teacher. He was lost in his work and therefore in part fulfilled the measure as applied to success. He was, however, an idealist without being a materialist, which would be fatal for the engineering teacher.

Does not success also depend somewhat upon whether or not a man has an avocation to go along with his vocation? Is he not happier and more efficient for "riding a hobby"? And is this not also especially true of the teacher? If he can forget entirely the problems of his "job" during his home time

is he not a better family man and does he not carry a better mind to his work the next day?

What has been the life of our S. P. E. E. during the past years? Has not its existence been due to the work of men who have believed in its aims and who have given their efforts to it for love? What compensation have they received except the satisfaction of knowing that they were creating a force for the good of engineering education? I have been a member of the Society for twenty years but not until I began to attend the annual meetings did I see and feel the possibilities of the organization. Now under its new aims and under the new life which is apparently before it, it behooves us all to put our shoulder to the wheel and push hard. When the President calls, let us all respond and make this a constructive year for the Society.

LARGE-SCALE PRODUCTION AS A COLLEGE STUDY.*

That our universities will have to take up large-scale manufacturing as a major subject, as important as medicine or law, is the editorial opinion of *The Electrical World* (New York). Every one will admit, it says, that the method of factory production in mass has come to stay. It has drawbacks and disadvantages, but it is so much more effective and economical than the older methods which it superseded that it is not likely to be altered radically. Even the Russian Communists have been unable to suggest any better. It is clear, the writer thinks, that if there is to be further progress in economical production it will be through the additional development of machinery and of quantity manufacture. He continues:

Large-scale production is closely associated with engineering; so that, as time goes on, manufacturing comes more nearly to resemble engineering processes. Along with the eternal economic vigilance in administration goes the perpet-

* *The Literary Digest*, Vol. 79, No. 2, p. 86.

ual scrutiny for the applications of chemistry and physics toward improved methods and tools.

It seems inevitable that the demand on the colleges of the country will be to prepare young men for eventual leadership in large-scale production. Setting aside the professions of law, medicine and theology, the trend is undoubtedly toward increased study of science, of economics and of business principles. In other words, the pressure on the colleges is toward the practical subjects associated with industry and away from the classics or classical forms of instruction. This is not a question as to the most advantageous or desirable kind of education. It is an inevitable consequence of economic pressure. According to the census returns of 1920, out of thirty-three millions of males gainfully employed, nearly eleven millions, or one third, were engaged in manufacturing mechanical industries, while nearly eight millions more, or one quarter, were engaged in transportation, distribution and public service. If we consider only the manufacturing third and allow the usual army rate of one officer to twenty-five men, there are about four hundred and forty thousand officers needed for this industrial army. A fair proportion of these leaders rise from the ranks by their industry, merit and natural ability; but it is the nominal duty of the colleges to produce men of this type. The task is, however, too much for the colleges, as at present organized, to fulfil. The total number of living male United States college graduates is estimated at about one third of a million, of whom only one fifth have graduated from technical schools.

As matters stand to-day, the leading industries seek to obtain college graduates, and preferably technical graduates. Complaints are heard that they are unable to obtain as many as they desire. Of course, says the writer, they look for more than a knowledge of principles and facts. They lay stress upon other important qualities, such as character, reliability and initiative. Recently the complaint has been made that the colleges do not select and train sufficiently for these latter qualities. There are manifest limits to their efforts in these directions. To quote further:

It would be a world calamity if the study of the classics, ancient history, art, religion and of many other non-commercial subjects were to cease. The economic and industrial

needs of a community are paramount and must first be met, but after they are satisfied come the artistic, intellectual and spiritual needs, which, if less clamorous, are greater and more precious to the world.

There are now more than one hundred and twenty-five American technical schools or colleges with an average of about four hundred students each; but the demand for good graduates is greater than the supply. The whole question occupies the special attention of the Society for the Promotion of Engineering Education, which met recently in Ithaca, New York, and which is just about to launch an effort to find some adequate solution.

THE CONTENT OF A DRAWING COURSE.

BY THOS. E. FRENCH,

Professor of Engineering Drawing, The Ohio State University.

At the Minneapolis Meeting of this Society in 1913, I happened to have the topic "The Educational Side of Engineering Drawing," in which the attempt was made to show the cultural as well as the practical value of the subject. Reference was made to the older methods of teaching drawing, the reactions against them, and the diversity of methods in use at the then present time.

As there are only one or two persons here who were present at the session at which that paper was read, I may perhaps be permitted to quote a few extracts from it in opening this discussion to-day.

I am not sure that this title is self-explanatory. It suggested itself from the wide diversity in the present methods of teaching drawing and the rather general feeling of unrest, as indicated partially by the abnormal number of textbooks on drawing that have been appearing recently. . . .

The analogy between drawing and language is often referred to. I prefer to go farther in saying that drawing, as a mode of thought expression, is a real and complete written language, with its orthography, its grammar and its style, its idioms and abbreviations; and that in teaching it we are not only preparing the student in a subject needed in his course, but, from the very nature of it have in our hands an exceptional cultural subject for strengthening the power and habit of exact thinking, that most difficult of all habits to fix, and for training the constructive imagination, the perceptive ability which enables one to think in three dimensions, to visualize quickly and accurately, to build up a clear mental image. This ability, which the power of recording the visualized impression and expressing it to others, is a requirement absolutely necessary for the young designer, and its study will develop a part of his mind which has previously had practically no exercise. . . .

With this conception of the subject, that it is once the foundation upon which all designing is based, and preëminent in its value for

mental discipline and training in space intuition, engineering drawing becomes, with the possble excepton of mathematics, the most important single branch of study in a technical school. . . .

Many of you remember the old courses in drawing, when there were fewer books and Warren was the standard. They were good old books, full of theory. The student of those days could project anything anywhere, but he could not make much of a working drawing. Afterwards Faunce's well-known book came in. The plates of this little old classic are not worn out yet, and although it has been obsolete for twenty years the book is still being sold on its record. . . .

In those old days there was however something of a recognized standard orthodox method of teaching drawing. . . . In the reaction against what is seen now to have been an excessive amount of theory, and with the attempt if not to govern at least to follow commercial practice, there has been so much variance of opinion that I believe it can be said that there is at the present time a greater diversity of method in the teaching of drawing than in any other in a technical school. . . .

It is in the present-day demand for the "practical" that there lies some of the danger of losing sight of the educational value of a subject that has in it the greatest combination of possibilities for the correlation of theory and practice.

In trying to show him in the quickest possible time how to make a working drawing, and how to place dimensions and letter a title, we are *apt* to miss the opportunity of training in the student the power of space conception, and clear thinking. . . .

Disregarding the copying courses . . . the methods now in use, with all their variations, may be divided into two general classes:

1. Those which begin with the theory of the point, line and plane, and progress to the solid. . . .
2. Those which begin with the solid, and afterwards take up the analysis of lines and surfaces.

Considering the first division, all of the older books on drawing from Binns to Faunce began with the projection and revolution of the point, and a few of the later books still adhere to this method. The schools using this method, however, generally begin immediately with a textbook on descriptive geometry. . . . This synthetic method, as it might be called, seems logical, but experience has shown that the student has much difficulty in understanding it clearly. . . .

The second method, taking up the explanation and practice of orthographic projection by using the solid, practical mechanical drawing if you please to call it, and afterward descriptive geometry as the term is generally understood, not only has the support of abundant proof in experience, but can be defended psychologically as well. . . .

While it is really descriptive geometry, I prefer to call all this "engineering drawing"—engineering drawing rather than "mechanical drawing." The term mechanical drawing is an unfortunate misnomer, which may mean either drawing with mathematical instruments or the drawing of mechanical things. Engineering drawing covers the whole field of technical drawing; and the important part of it *could* be taught with only a pencil and a pad of coördinate paper. . . .

In conclusion let me contend for a better recognition of the general department of engineering drawing, including descriptive geometry. Let it be preferably a separate department, manned by a corps of efficient, experienced, well-paid instructors. . . .

In the ten years that have passed since that was written there has been a considerable change. There is a better conception of the purpose and value of the subject; an approach toward uniformity in teaching it; a greater respect for it from our colleagues teaching other branches; more separate departments of engineering drawing (the term *engineering drawing* was scarcely known ten or fifteen years ago); better salaries for drawing instructors; and in consequence of all this, better preparation of our students for their work as engineers.

Drawing courses in different colleges are not all uniform, nor should they be expected to be, but I believe there is now no greater diversity than there is in other engineering subjects. No two schools teach mechanics or physics or chemistry in exactly the same way. In drawing as in all these subjects the variations are more in details of arrangement and content than in fundamental principle. For example, there are very few now who begin with what we called the synthetic method. The University of Michigan, one of the last to hold out for this method, now begins with a course in orthographic projection—and incidentally has changed the name of the department to the "Department of Mechanism and Engineering Drawing."

In discussing the content of a course in any subject the first question naturally is, what is the purpose of the course? It seems very trite to us to say that drawing is the language of the engineer. That is the basis upon which all our courses are

built, and the main purpose of our work is to train the student to a facility in its thought and expression. Sometimes however we have to explain to our friends that our purpose is not simply to train draftsmen. The making of a finished draftsman of a student is of even less importance than it was twenty years ago when more engineers started through the drafting room. Not so very long ago a member of a college faculty—one of those men whose experience has all been commercial—made the statement that he could teach all the drawing a student needed to know in three weeks. Of course he could, so could you, on his idea that teaching drawing is only teaching how to draw—how to use a T square and a scale and a ruling pen. He did not understand that that part of our subject is only the means of expression. A physics professor once remarked to me that he did not know how we could give an examination in drawing! The respect for our subject, while growing, is evidently not yet universal.

After the *purpose* comes the question of the *extent* of the course. I am very firmly of the opinion that the time allotted to the department of engineering drawing should be sufficient to cover a first course giving an adequate grounding in the principles of shape and size description, a course in descriptive geometry, and these followed by a course or courses that will take the student into the interesting part of the subject showing him the application of all he has learned before as carried out in engineering practice. This would include, except possibly for civil engineers and architects, freehand sketching, machine drawing and elementary design. I believe such a course should be taught by the people who laid the foundation, who know just how much the student knows about the principles and who are interested in training him into correct and fluent expression in the graphic language.

With the purpose and extent determined, the content of the elementary courses may for the purpose of analysis be divided into four parts, although in application these divisions will of course overlap.

A. The method of writing the language,
B. The theory of shape description,
C. The theory of size description,
D. The applications to practical drafting.

A course in drawing consists essentially of a series of problems to be worked by the student in connection with his study of the theoretical principles, and the selection, arrangement and method of presentation of these problems is the one great factor, aside from the personality of the teacher, in the success of the course. Every problem must have a reason for its use and for its particular place in the sequence. The form in which it is given is fully as important as its selection. It must be presented in the way best adapted to bring out its teaching points, whether as a model or casting, a pictorial sketch, an orthographic sketch or a verbal description.

The inexperienced teacher's lack of familiarity with the pedagogy of the subject sometimes leads to mistakes in the use of problems. We often find illustrations of this in teacher's classes when the assignment of preparation of a hypothetical course is given and the students pick out from some book what looks like a good problem but put it in at a place for which it was not designed and does not fit.

The true test of a problem's value is what it teaches. The writer once said in effect, in giving "specifications" by which to judge a problem, that a good problem should

1. Illustrate primarily one important feature of the language of drawing, a feature which will recur incidentally on subsequent drawings.
2. Take its place in the scale of difficulty.
3. Contain a minimum of repeated detail.
4. Be an object of some interest and one with whose form, use or place the student might be expected to be familiar.
5. Not be obsolete in design.

In passing, we might say from some experience in trying to write textbooks that the hunt for problems is the hard end of

writing a book. It takes a little study to write the text and get it so one thinks a student could understand it, but selecting, designing and inventing problems that will teach just what you want and no more, that will stand the acid test, take much more time and thought.

Using the four divisions proposed as a basis, the content of a course would be decided by arranging a proper balance of recitation, quiz and laboratory, then selecting a series of problems to cover the teaching points. The first division is of course preliminary to the study of the language, and its keyword is "good form." Problems involving the use of the various instruments however need not be a long series of meaningless repetition of lines and interlaced figures. This division overlaps quickly and naturally. The study of lettering would be classified in this division although its practice should be continued throughout the course.

The second division is the one requiring the most careful thought, as being the "grammar" of the language. The apparent simplicity of orthographic projection is deceptive and teachers sometimes do not realize the difficulties of beginners in grasping the conception of representing space relationship on paper. A careful balance of theoretical and practical problems is called for, with the order of progression easy and logical. The pictorial methods naturally belong in this division.

The theory of size description does not in some instances receive the treatment it should. Too often the student is left with the impression that dimensions may be hung on a drawing almost anywhere, just so he gets enough on! The systems of dimensioning should be taken up, the advantages and disadvantages discussed, materials and methods of machining considered and progressive problems in dimensioning assigned.

These three divisions are all in preparation for the fourth, in which the various classes of working drawings and the conventional practices of commercial drafting room work are taken up. It presents the most varied and interesting part of the subject, brings out the student's initiative and gives

him perhaps for the first time a real appreciation and respect for the language he has been learning.

Drawing is one of the difficult subjects to teach, and in its pedagogy, complicated and elusive, the question of content has an important part. Good instructors are not only hard to find but hard to hold, and an inexperienced man should not be given the responsibility of outlining a course. It must be done by men of experience and judgment. Let me urge those of you who feel a lack of appreciation or support to assert the dignity of your department. Educate your colleagues and your boards of control to a knowledge of its importance and value until the subject is recognized as being what it was called in the quotation "the most important single branch of study in a technical school."

ELEMENTARY CIVIL ENGINEERING.

BY J. W. JOURDAN,

Professor Civil and Irrigation Engineering,

N. M. College A. & M. A.;

Now Professor Civil Engineering, N.M. School of Mines.

The course in elementary civil engineering was given during the fall term of 1920 for the first time, and the results have been satisfactory. The course was planned without the usual guide of precedent, for the simple reason that very few precedents existed. The general plan of the work has been settled, and future changes will affect only the details.

The course is designed to familiarize the student with the materials of engineering and the applications of civil engineering, and comprises practical problems in surveying, measurements, the study of the physical properties of materials, the inspection and simple analysis of engineering structures, and concrete construction.

The surveying work is purposely made very simple because this subject is taken up thoroughly in the sophomore year. In this part of the course, the student is required to inspect and handle the steel tape, the engineer's level, the surveyor's compass, the transit, and various rods and other kinds of surveying equipment. Familiarity by the student with the tools of surveying will expedite the regular course in surveying which follows later. The use of the steel tape is exemplified in the measurement of the engineering group of buildings and the intervening grounds. After the measurements are checked, a map of the group is made as soon as the Freshman course in drawing is sufficiently advanced. Among other things, the taping exercise shows the student that a fairly intricate problem may be solved by the use of a very simple instrument. A large part of the work of the young civil engi-

neer involves either the actual taking of measurements in the field, or the interpretation of measurements from drawing and maps. To correlate field and office dimensions the students take accurate measurements of a reinforced concrete pergola, situated on the campus and consisting of columns, footings, beams and benches. This exercise is found to stimulate the student to ask questions concerning the elements of design and construction. After the measurements have been checked, the notes are kept to be used later in making a complete inked drawing of the structure, including plan, elevations and sections. The instructor is on hand constantly to answer questions, point out details, explain how the structure was built, etc., but the student is left to use and develop his own initiative and judgment in attacking the problem.

A part of the time allotted to field work is spent in the inspection and sketching of engineering features such as roof and bridge trusses, retaining walls, culverts and the like, and in the study of street paving, sewerage systems, water works or other civil engineering features in the vicinity that can be used to broaden the student's conception of engineering.

The study of the materials of engineering is conducted in the laboratory for testing materials. The students attend, prepared to take notes on and plot the test data as they are developed. The construction of the various testing machines is explained and then actual tests are made on the different kinds of materials. Cross bending tests of building and paving brick are made, followed by tests of brick in compression and tests to determine the absorption properties of brick. Neat cement and mortar briquettes are tested in tension and the tests for the soundness of cement are explained. The testing of concrete in compression is illustrated by breaking several concrete cubes and cylinders.

The behavior of iron and steel when subjected to tension is studied, emphasis being laid on the proper preparation of the specimen, placing it in the machine, and observing the critical periods of the test. The cross bending test of cast iron is made and a load deflection curve is developed.

Flexure tests of small wooden beams are made, followed by tests in compression. A brief lecture on the structure of timber and its uses in engineering accompanies the tests. It is realized that the freshman engineer is not sufficiently well grounded in mathematics and mechanics to fully interpret the test data, and that the chief value of the tests will develop later, when the student takes up the study of mechanics and the design courses that involve the selection and uses of structural materials.

Incidentally, the course in testing materials, coming in the senior year, will be advanced by the general understanding of the subject obtained in the elementary study.

Near the end of the course, elementary concrete construction work is given. The selection and proper handling of cement is followed by the study of sands, gravels and broken stone. Lectures covering the mixing, depositing and care of concrete are succeeded by the actual construction in the field of concrete work. The problem this year involved the building of a concrete foundation and a two-course concrete floor. The students laid out the foundation, set the grades, built the forms and conducted the entire work from start to finish. They also built the screens and the mixing board. The concrete was mixed by hand which is the proper method for the beginner to use.

Four hours of practice every week and one hour of class room work are devoted to the course. Work in the class room consists of lectures, problems, and discussions, which coördinate the work in the field. A limited part of the lecture periods is used in touching on the economic and human side of civil engineering.

It is believed that the good results to be expected from this kind of course will be threefold. First, the course will aid the student in the choice of the branch of engineering he wishes to follow; second, it will give life and interest to the theoretical studies he pursues later; and, third, it will make him a more valuable man in the vacation job, more valuable to his employer and more valuable to himself.

THE ENGLISH DEPARTMENT.

One of the things quite definitely settled by the Conference of English teachers held at Cornell in connection with the annual meeting of the S. P. E. E. was that a survey of the courses in English in our engineering schools should be made with a view to determining how the problem of English training for engineering students is being solved under various conditions. Having a real aversion to questionnaires and to the lying evidence of statistical data, the chairman of the English Committee is using this column to request all friends of the cause of effective English teaching in our technical schools to write him as soon as convenient regarding the courses being offered in English in their particular college. The committee would be glad to have not only definite information regarding the courses offered, and the manner of their administration, but statement of tangible problems which have arisen from local conditions. What the chairman really wants is a perfect avalanche of live, significant letters. Of course if these may be friendly and constructive in tone, he will be happier than otherwise, but since criticism, even of a negative sort, is often stimulating, he will appreciate the frank statement of various points of view.

To put it quite definitely, will you not, in the interest of this large and concerted movement for more effective teaching of English in our engineering schools, take the time to write a letter giving the English Committee the following information:

1. What are the requirements in English in your college?
2. What elective courses in English are open to the engineering students?
3. Are the English courses given by the College of Liberal Arts in mixed sections, or in special sections for engineering students, or have you a separate English staff devoting all its time to the engineering students?

4. What special plans have you for securing the correlation of the English with the technical courses?

5. What are the specially encouraging features of the English work in your college; what are some of its most serious problems?

Perhaps the committee can use no more effective means of getting the letters it needs than to threaten a real, heart-searching questionnaire, in case voluntary contributions do not begin to appear with the needed promptness.

Address J. Raleigh Nelson, 927 Forest Ave., Ann Arbor, Michigan.

REACTIONS ON THE CORNELL MEETING.

Most beautiful place of all to hold the meeting. Housing and eating arrangement gave each one a splendid opportunity to become better acquainted and to talk over problems informally with his colleagues. Even more opportunities for informal social gathering should be provided.

J. L. BEAVER, Lehigh University.

1. A new spirit of determination among the members to make the Society a potent factor in engineering education by carrying out the purposes for which it was created.

2. A growing sense of responsibility among the industries toward coöperation with the Society.

H. S. BOARDMAN, University of Maine.

To one engaged in the organization of a modern school of engineering, the Cornell meeting was a source of inspiration.

B. M. BRIGMAN, University of Louisville.

A turning point in the Society. The emerging from the close, somewhat narrow viewpoint of a collection of teachers towards a broader conception of the responsibility of the educator to develop contacts.

W. E. BULLOCK, A. S. M. E.

Cornell University is to be congratulated upon a successful meeting. The visiting members appreciated the courtesies that were extended.

J. P. CALDERWOOD, Kansas State Agricultural College.

Rooming and eating in the spacious dormitory, with its fine appointments, furnished the opportunity for making acquaintances, getting together, visiting and talking over the affairs of the Society, a thing of no small import, unsurpassed in any previous meeting. The manifest interest of business

men in the work of the Society is most encouraging to the teacher of engineering.

GEO. R. CHATBURN, University of Nebraska.

Highly instructing, profitable and entertaining and mutually beneficial. I felt particularly the presence of a democratic spirit which seemed to be a reflection of that existing at Cornell.

PAUL CLOKE, University of Arizona.

1. Changing status of the modern type of engineer. Requirements set by ever-changing body politic.

2. The analysis of Mr. Wickenden where he so ably presented what was to me a very unique and valuable comparison of the development and growth of the college and the non-college man.

3. The continuation of a steadily repeated demand for cultural values as a part of engineering education.

4. Recognition of engineers' opportunity and duty to take part in municipal and civic affairs in general.

SAMUEL L. CONNER, Tufts College.

Cornell has a beautiful campus. The entertainment of the guests was perfect. Leaders are born not made. The colleges, however, can assist in the training of executives; but executive positions are obtained only after long active experience in subordinate niches.

F. H. CONSTANT, Princeton University.

The recent Cornell meeting of the S. P. E. E. was one of the most enjoyable and profitable meetings I have attended. The general subject—"Leadership"—was a timely one and was ably handled. We were especially fortunate in having such excellent papers presented by leaders in our industries and by representatives of the National Industrial Conference Board, and of the U. S. Bureau of Education. The changing requirements of the industries were brought home to us with emphasis and the increased interest in the importance of English and in the problem as to how we can best modify

our curriculums to enable our graduates to best meet the new requirements is, I believe, a very hopeful sign.

The hospitality of the Cornell officials and faculty was such as will cause the Cornell meeting to be remembered as one of the most delightful meetings of the Society. The accommodations and provisions made for our happiness were ideal.

CALVIN H. CROUCH, University of New Hampshire.

Of the six annual conventions that I have been fortunate enough to attend, this Cornell meeting stands out because of the notable value of the papers there presented.

LEONARD A. DOGGETT, Penn State College.

It was well worth while. It was very evident from the trend of remarks that no one believes that leaders could be made, but that training in accordance with principles laid down would develop to the fullest extent men who possessed the qualities for leadership. It was the most interesting meeting out of the 15 or more meetings I have attended in the last 25 years.

F. O. DUFOUR, Lafayette College.

Dean Kimball's address on Training for Leadership was alone worth the cost of attending the Cornell meeting. When the other addresses on the same general theme are added, truly good measure was given. Moreover, aside from the unusual value of the papers presented, the general feeling of confident optimism in the new project of the Board of Investigation and Coördination was most inspiring. Surely President Scott and Secretary Bishop are to be congratulated.

JOHN H. DUNLAP, A. S. C. E.

The Ithaca Convention stands out as a distinct formulation of the great demand which will be made upon the engineer of the future. It also showed a determination and optimism regarding the response which the engineers are ready to make to this demand.

O. J. FERGUSON, University of Nebraska.

REACTIONS ON THE CORNELL MEETING.

A good meeting, full of inspiration. But I did not find out how to change our curricula to enable us to train leaders out of men who would not be leaders anyway.

F. A. FISH, Iowa State College.

The manifest desire of teachers of engineering to learn of the needs of the employer and practician, in order to arrange suitable curricula to attain the desired ends, seemed clearly apparent at the Cornell meeting, and augurs well for continued efforts to keep abreast of the times.

J. C. FITTERER, University of Wyoming.

This meeting was one of the most enjoyable of any I have attended and of as great potential value. The ultimate value will largely depend upon the manner in which the spirit of the meeting is fostered and developed in the various institutions and followed up by the Board of Investigation and Coördination.

ALMON H. FULLER, Iowa State College.

The best convention of the S. P. E. E. that I have attended. We are awakening to the realization that we have some worthwhile problems to solve. With the hearty coöperation exhibited at this convention by representatives of industry, the gulf between past academic discussions of the "S. P." and the adequate accomplishment of the "E. E." will be rapidly and effectively bridged.

C. FRANCIS HARDING, Purdue University.

It was an especially inspiring meeting at which there was an energetic exchange of ideas. The discussion of leadership was on an especially high plane.

JOHN F. HAYFORD, Northwestern University.

The quality of the program and the entertainment set a new high water mark in the Society's meetings.

F. G. HIGBEE, University of Iowa.

More uncertain than ever that we are doing "the right

thing in the right way" in educating engineers. A stronger desire to discover the weak spots in our training methods, and to know what course content should be.

E. A. HITCHCOCK, The Ohio State University.

This meeting convinced me that the real fruit of the S. P. E. E. work is going to come in increasing measure from the informal departmental conferences, and less and less from the discussion of set papers, which, however ably prepared, too often fall flat through failure to present them forcefully.

CARL T. HUMPHREY, Villanova College.

It was one of the most fruitful and successful that the Society has ever held, and the President and the Secretary are to be congratulated.

DUGALD C. JACKSON, Massachusetts Inst. of Tech.

The outstanding impression that I received from the Cornell meeting was the potential possibilities of a Society composed as is the S. P. E. E. of highly intelligent men. Surely it can do a great work if its energies can be properly directed.

DEXTER S. KIMBALL, Cornell University.

The best convention of the Society I have ever attended. Papers inspiring and suggestive, discussions lively and profitable. In particular the well-planned and comprehensive program presented by the Board of Investigation and Coördination promises far-reaching results of constructive character.

A. C. LANIER, University of Missouri.

A good program, instructive and interesting and well carried out! The Local Committee deserves highest praise for complete arrangements and entertainments.

O. M. LELAND, University of Minnesota.

Deeply impressed by the plans of the Board of Investigation and Coördination and the assurance that its study of engineering curricula will be pushed actively at once.

OLIVER S. LYFORD, National Industrial Conference Board.

The Ithaca meetings indicated to me that engineering educators are coming more to realize that they must be teachers as well as engineers—they must unite two professions in one. Further, the field of the engineer is rapidly expanding, particularly into the realms of business and management. Hence the engineer of the future must be broadly trained.

Jos. F. Merrill, University of Utah.

It was the best meeting of the Society that I have ever attended. It was rather a strenuous program for hot weather, but so interesting that I did not want to miss any of it.

Hugh Miller, George Washington University.

An affirmation that leadership is not a matter of education per se. Most of the comment of those present was to the effect that the program was overburdened with truisms on leadership and educational generalities.

L. W. Morrow, McGraw-Hill Publishing Company.

The meetings were both interesting and inspiring. The Cornell campus is an ideal place for holding a meeting and the social program was delightful.

W. E. Mott, Carnegie Institute of Technology.

Came away much heartened by the fine spirit of non-controversial inquiry into the results and significance of engineering education that marked this meeting.

George B. Pegram, Columbia University.

Meeting was a great success. President Scott has performed a great service to the engineering profession by concentrating the attention of the S. P. E. E. members upon good teaching. This Board of Investigation and Coördination will lay the foundation for future progress in Engineering Education. Cornell authorities deserve congratulations upon the manner in which the program and entertainment features have been carried out.

A. A. Potter, Purdue University.

From the standpoint of good fellowship, opportunities for informal discussion and general inspiration, I consider the Cornell meeting the best I ever attended. The papers on "Training for Leadership" were of a high order of excellence, but I am as yet unconvinced that we can build a program of studies that will in itself train for leadership. The solution will be to secure teachers of engineering who are themselves leaders with a capacity for inspiring students and developing their talents.

EDWARD H. ROCKWELL, Rutgers College.

That the adequate teaching of English to technical students offers as many problems as there are schools, but in those schools where the dean or president is enthusiastically interested, the problem is well on the way to solution.

FRANK E. SEAVEY, Tufts College.

To me the most valuable meeting of the S. P. E. E. it has been my privilege to attend.

GEO. C. SHAAD, University of Kansas.

That we are beginning to get a more definite understanding of the problem of engineering education.

F. H. SIBLEY, University of Nevada.

To one who has been out of the "teaching game" for several years, the chance to bask in an academic atmosphere once more and to renew old acquaintances was a pleasure and a privilege.

A. C. STEVENS, General Electric Company.

I. Disappointment. It was sometimes suggestive, but never constructive. "Leadership" seemed an Ignus Fatuus.

II. Enlightenment. Came chiefly from the leaders in the industries; they in the main confirmed our beliefs as to the genuine value of college training.

III. No one failed to exalt the "Fundamentals"; but no one ventured to declare what was truly fundamental.

IV. S. P. E. E. meetings seem to me to spread themselves

out too much on the generalities of the teacher's aims and never to grapple with his vital problems.

W. M. THORNTON, University of Virginia.

Excellent and inspiring.

I would suggest for further programs a slightly less crowded schedule with more time for discussion.

ELTON D. WALKER, The Penna. State College.

A large and enthusiastic meeting with a distinct objective. The program of the second day was one of the best ever presented. Surroundings and entertainment ideal. Meeting as a whole a little too long,—a day might be saved.

P. F. WALKER, University of Kansas.

It was a splendid inspirational meeting for men engaged in the work of engineering education. A vision of a new type of engineering education seems to be prevalent, and when this new education becomes formulated and organized, it will mean much to the engineering profession and to the public in general. The convention was splendid, and the memory of it will remain with me long.

W. B. WENDT, South Dakota School of Mines.

The elements of leadership were clearly and forcefully brought out but somehow the feeling comes that mathematics and steel and copper and stirring the earth are not all of life even for an engineer and that making a human being an automatic attachment to a machine is not a good thing.

MORRIS WENK, Oregon Agricultural College.

A rising tide of optimism and of confidence in the future of the Society; a growing belief that a period of progress lies just ahead, and that this progress will be achieved largely through the impetus and initiative of the colleges themselves, with the Society as their agency of coöperation; an increasing sympathy between the colleges and the industries and a better understanding of the problems and obligations of each.

W. E. WICKENDEN, American Tel. and Tel. Co.

A Reaction.

"Kindly accept my resignation from membership in the Society for the Promotion of Engineering Education.

"May I state my reason for wishing to resign? Frankly, I do not like the Society. As a student of mechanics I see it as a part of my program to avoid such glittering generalities as the Society appears to be given to.

"I am basing this statement on impressions; I do recognize the possibility that, may be, the Society will do wonders."

REPORT OF PROGRESS OF COMMITTEE NUMBER 20, ON THE STANDARDIZATION OF TECHNICAL NOMENCLATURE.

This report reviews briefly the work of recent years, and presents certain symbols for heat and steam for the consideration of members who are interested. The list is not offered for adoption, for the reason that there is a probability of international standardization through the efforts of the American Engineering Standards Committee, and the adoption of a standard for the United States might reduce this probability.

About two years ago a committee of the American Society of Mechanical Engineers made a preliminary report on symbols for heat and steam. A tentative draft of this report was mimeographed by Committee Number 20 and sent to one hundred and eighteen professors of engineering and thermodynamics. Twenty-four replies were received, of which nineteen gave interesting and helpful suggestions.

The following symbols were approved by more than half of the gentlemen who discussed them.

Concept.	Symbo
Heat content (liquid)	h
Heat content (saturated vapor)	H
Heat content (superheated vapor)	H^1
Pressure (lbs. per square in.)	p
Pressure (lbs. per square ft.)	P
Volume (liquid)	v
Volume (saturated vapor)	V
Volume (superheated vapor)	V^1
Mechanical equivalent of heat	J
Reciprocal of the mechanical equivalent of heat	A
Latent heat of vaporization	L
Internal latent heat	r
Ratio of specific heats	γ
Specific heat at constant pressure	C_p
Specific heat at constant volume	C_v

It is likely that lower case r has been used so frequently to represent latent heat of vaporization that its use for internal latent heat might be questioned.

Some idea of the variation of opinion regarding various concepts may be obtained from the following table. In several instances the preferences of certain men for symbols were obtained from books written by them. Most of the information in the table, however, is the result of correspondence.

Concept.	Symbol.	Names of Adherents for Symbols.
Temperature (liquid)	$t = T$	Ennis, Trinks, Vose, Flather, Hoefer, Kottcamp
(sat. vap.).....	"	Ennis, Trinks, Vose, Flather, Hoefer, Kottcamp
(sup. vap.)....	T^1	Ennis, Trinks, Vose, Flather, Hoefer, Kottcamp
(sup. vap.)....	T_s	Potter
(Fahr.)	t	Emswiler, Marks, Frank, Fessenden, Greene, Magruder, Goodenough, Klein, Chase, McKergow
(abs.)	T	Emswiler, Marks, Frank, Lucke, Fessenden, Magruder, Goodenough, Klein, Chase, McKergow, Greene
(abs.)	t, T, T^1	Davidson
(Fahr.)	f, F, F^1	Davidson
Pressure, lbs. per sq. inch..	p	Ennis, Trinks, Vose, Fessenden, Magruder, Potter,, Frank, Lucke, Flather, Crouch, Hoefer, Chase, Emswiler, Daugherty, Kottcamp
lbs. per sq. foot...	P	Frank, Magruder, Crouch, Chase, Emswiler
Volume, liquid.....	v	Ennis, Trinks, Vose, Flather, Fessenden, Kottcamp, Hoefer, Klein, Davidson, Potter, Daughtery, McKergow
sat. vap.....	V	Ennis, Trinks, Vose, Flather, Fessenden, Kottcamp, Hoefer, Davidson, Potter
sup. vap.....	V^1	Ennis, Trinks, Vose, Flather, Hoefer, Kottcamp, Davidson

liquid	v^1	Frank
sat. vap.	v^{11}	Frank
sup. vap.	v	Frank, Lucke
liquid	V_2	Lucke
dry steam	V_s	Lucke
sup. vap.	V_s	Fessenden, Potter
wet steam	v	Chase
cu. in.	v	Magruder, Emswiler, Marks, Fessenden
cu. ft.	V	Magruder, Emswiler
dry sat. st.	S	Klein, Chase
sup. vap.	V	Chase
Entropy, liquid	n	Ennis, Trinks, Vose, Flather, Hoefer, Kottcamp, Davidson, Marks
sat. vap.	N	Ennis, Trinks, Vose, Flather, Hoefer, Kottcamp, Davidson, Marks
sup. vap.	N^1	Ennis, Trinks, Vose, Flather, Hoefer, Kottcamp, Davidson, Marks
liquid	S^1	Frank, Goodenough, Green
sat. vap.	S^{11}	Frank, Goodenough, Green
sup. vap.	S	Frank, Goodenough, Green
liquid	ϕ	Lucke, Fessenden, Crouch, Daugherty, McKergow
dry steam	ϕ	Lucke, Daugherty
sup. st.	n	Lucke
liquid	Θ	Chase
wet steam	$\Theta + \frac{L}{T}$	Chase
water	N_w	Magruder
sat. vap.	N_s	Magruder
sup. vap.	N_s	Magruder
dry steam	n	Chase
sup. steam	N	Chase
liquid at 32°	e	Emswiler
Mechanical equivalent	J	Ennis, Trinks, Frank, Lucke, Flather, Fessenden, Magruder, Hoefer, Davidson, Chase, Emswiler, Marks, McKergow, Kottcamp
Its reciprocal	A	Ennis, Trinks, Frank, Vose, Flather, Magruder, Hoefer,

		Davidson, Chase, Potter, Marks, Kottcamp
	No symbol	Emswiler
Dryness	q	Trinks, Davidson, Emswiler, Potter, McKergow, Kottcamp
	x	Frank, Fessenden, Magruder, Goodenough, Hoefer, Chase, Marks, Ennis, Daugherty
	z	Vose
Latent heat of vap.....	$L = H - h$	Ennis, Trinks, Lucke, Vose, Flather, Kottcamp, Magruder, Crouch, Hoefer, Davidson, Chase, Emswiler, Potter, Marks, Daugherty, McKergow, Frank, Fessenden, Goodenough, Klein, Green
Entropy of vaporization....	$N - n$	Ennis, Trinks, Vose, Hoefer, Potter, Marks, Lucke, Kottcamp
	r	Fessenden, Goodenough, Marks,
	$\overline{T}$	Peabody, (Mollier), Crouch
	m	Davidson
	$\frac{L}{T}$	Chase
	N	Emswiler
Internal latent heat.....	r	Ennis Trinks, Vose, Flather, Magruder, Kottcamp, Crouch, Hoefer, Davidson, Emswiler, Potter
	ρ (rho)	Fessenden, Klein, Chase, Greene, McKergow
	l	Frank, Marks
	L	Goodenough
Ratio of specific heats.....	y	Ennis Trinks, Vose, Flather, Magruder, Hoefer, Davidson, Potter, Daugherty, Kottcamp
	k	Frank, Emswiler
	γ (gamma)	Flather, Fessenden, Chase, Marks
	κ (kappa)	Goodenough, Klein
Specific heat at constant pressure.....	C_p	Ennis, Trinks, Lucke, Vose, Flather, Kottcamp, Fessenden, Magruder, Hoefer, Klein, Davidson, Potter, Marks, McKergow

	c_p	Chase, Emswiler, Goodenough, Frank
Specific heat at constant volume.....	C_v	Ennis, Trinks, Vose, Flather, Fessenden, Magruder, Hoefer, Klein, Davidson, Potter, Marks, McKergow, Kottcamp
	c_v	Frank, Goodenough, Chase, Emswiler
Heat equivalent of external work.....	Apu	Chase, Emswiler, Heck, Magruder
Intrinsic energy, liquid.....	u^1	Frank
sat. vap...	u^{11}	Frank
Density, liquid.....	$\frac{1}{v^1}$	Frank
sat. vap.....	$\frac{1}{v^{11}}$	Frank
sup. vap.....	$\frac{1}{v}$	Frank
Specific heat of superheated vapor.....	C_p	Chase
	c_p	Frank, Goodenough
Exponent of polytrophic equation	n	Emswiler
Gas equation constant.....	R	Emswiler
Internal energy.....	E	Marks, McKergow

This compilation of preferences is not encouraging. It is presented as interesting and suggestive. It appears wise at this time to hold this information in reserve until the efforts for international standardization of symbols for heat and steam through the American Engineering Standards Committee give definite results. If international standardization does not occur soon, the foregoing table can be used as a starting point for a standard list of symbols in heat and steam for the United States.

For the convenience of members, the list of symbols in mechanics and hydraulics adopted by the Society for the Promotion of Engineering Education on June 28, 1918, is reprinted.

JOHN T. FAIG.

REPORT OF COMMITTEE NO. 20.

SYMBOLS APPROVED BY THE SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION, JUNE 28, 1918.

Concept.	Symbol.
Acceleration, angular	α (alpha)
Acceleration due to gravity	g
Acceleration, linear	a
Area	A
Breadth	b
Center of rotation	O
Coefficient of friction	f
Coefficients and constants	C, K
Deflection of beam	y
Depth	d
Diameter	D
Distance passed over	s
Distance of extreme fiber from neutral axis	c
Eccentricity of application of load	e
Efficiency (hydraulic, mechanical, volumetric)	e_h, e_m, e_v
Force	F
Force, moment of	M
Friction, coefficient of	f
Head	H
Height	h
Horsepower	$hp.$
Hydraulic radius	R_h
Inertia, polar moment of	J
Inertia, rectangular moment of	I
Length	L
Load, eccentricity of application of	e
Mass	m
Modulus of section	z
Modulus of elasticity, Young's	E
Moment of force	M
Moment of inertia, polar	J
Moment of inertia, rectangular	I
Quantity of liquid flowing	Q
Radius	r
Radius of gyration	k
Reactions	R
Revolutions per unit of time	N
Stress, unit	S

REPORT OF COMMITTEE NO. 20.

Time	t	
Torque	T	
Velocity, angular	ω	(omega)
Velocity, linear	v	
Volume	V	
Weight	W	
Young's modulus of elasticity	E	

COLLEGE NOTES.

Carnegie Institute of Technology.—Professor O. T. Geckeler has been appointed head of the Department of Mathematics at Carnegie Institute of Technology to fill the vacancy caused by the death of Professor S. S. Keller.

Public Lectures will be given during the current year by Dr. Nils Bohr, of the University of Copenhagen, and the winner of the Nobel Prize in Physics for 1922; Dexter S. Kimball, Dean of the College of Engineering at Cornell University; Dr. John Erskine, Professor of English at Columbia University; Professor Alfred Stansfield, of the Department of Metallurgical Engineering at McGill University, Montreal, Canada; and Dr. Harry N. Holmes, Professor of Chemistry, Oberlin College.

Case School of Applied Science.—The following additions to the faculty were made at the beginning of the college year: *Mathematics:* V. I. Benander; *Chemistry:* A. E. MacGee; *Mechanical Engineering:* C. MacKinnon; *English:* G. W. Bradford, H. R. Young.

During the summer vacation a rearrangement of offices and classrooms was made in the Department of Metallurgy and Mining, which gives improved facilities for instruction in the subjects taught in this department.

Arrangements are being made to hold a meeting of this branch of the S. P. E. E. early in the month of December.

State University of Iowa.—G. K. Pierce has resigned his position as Instructor in Electrical Engineering.

Professor A. H. Ford is on a leave of absence for the current year.

Thomas Matthews has been appointed Assistant Professor of Central Station Engineering in the Department of Electrical Engineering.

Carl Menzer has been appointed Instructor in Electrical Engineering.

The University has contracted with the Western Electric Company for the installation of a 500-watt broadcasting equipment, which presumably will be in operation before this note is printed. The station is to be operated by the College of Applied Science.

Massachusetts Institute of Technology.—The first of the Aldred Lectures at the Massachusetts Institute of Technology, established by Mr. J. E. Aldred, who carried to a successful conclusion the immense hydroelectric development at Shawinigan Falls on the St. Maurice River in Canada, is announced for the afternoon of November 9th. Mr. Gerard Swope, a Technology graduate, of the class of 1895, president of the General Electric Company, will deliver the first of the lectures. Other eminent industrialists and engineers are to complete the programme for the first year which will consist of twelve lectures.

President Stratton has appointed Professor D. C. Jackson, head of the Department of Electrical Engineering, and Professor Vannevar Bush, in charge of graduate work in Electrical Engineering, to coöperate with Mr. Aldred in establishing the lectures. A number of prominent men have been invited to give papers in a schedule that is being arranged to cover the next five years.

The **Michigan College of Mines** has received a gift of $10,000.00 from Dr. Edgar Kidwell, head of the Kidwell Boiler Company of Milwaukee, Wisconsin, for the founding of a scholarship to be known as "The Paul M. Kidwell Memorial Scholarship." Paul M. Kidwell, a son of Dr. Edgar Kidwell, was a member of the U. S. Marines and was killed in action against the Germans at Belleu Wood, France, June 6, 1918.

The Scholarship is for the purpose of aiding capable students who would otherwise be unable to pursue an engineer-

ing course. As long as opportunity therefor exists, preference is to be given to young men who saw service overseas with the land or naval forces of the United States.

Dr. Kidwell was formerly Professor of Mechanical and Electrical Engineering in the Michigan College of Mines.

University of Minnesota.—The enrollment this fall shows a considerable increase over last year.

The new Electrical Engineering Building is in process of construction. It will be completed next summer. The cost of the building and additional equipment will be $375,000.

Professor J. J. Flather, head of the Department of Mechanical Engineering, and Professor W. H. Kirchner, head of the Department of Drawing and Descriptive Geometry, are absent on sabbatic furlough for the year. Professor Flather is in California, and Professor Kirchner will spend the year in Europe.

During the past summer, the Department of Mechanical Engineering has lost two members by death, namely, Associate Professor J. H. Rowen, of Power Plant Engineering, and Mr. E. P. Quigley, Instructor in Forge Practice.

Professor Charles F. Sidener has retired under the terms of the Carnegie Foundation after 40 years of service. He has been Chief of the Division of Analytical Chemistry.

Among recent additions to the staff may be mentioned the following instructors: Rhodes Robertson, Architecture; Berry E. Brevik and Joseph A. Wise, Civil Engineering; John Flodin, Thomas P. Hughes, Dayton A. Rogers, Ronald M. Hazen, Laurence F. Campbell, C. Robert Egry, and Charles C. Sampson, Mechanical Engineering; Edward F. Murphy, Claude W. Campbell, Walter C. Lawson, and Lloyd J. Quaid, Drawing and Descriptive Geometry; Walter R. Warne and Frank E. Miller, Mathematics and Mechanics; J. Lewis Maynard, Chemistry; Robert C. Ernst, Chemical Engineering.

Newark Technical School.—Following advances in grade

in the faculty of the College of Engineering have been made under date of September 1:

James A. Bradley, former Instructor in Chemistry in the College, has been appointed Associate Professor of Chemical Engineering; Bedross S. Koshkarian, former Instructor in Applied Mathematics in the College, has been appointed Associate Professor of Applied Mathematics; Albert A. Nims, Instructor in Electricity in the College, has been appointed Assistant Professor of Electrical Engineering.

The faculty of the College of Engineering has been strengthened by the addition of the following instructors: H. H. Metzenheim, Instructor in Physics and Mechanics, and Alexander Perry Roberts, Instructor in Mechanical Engineering. The school has established coöperative relations this year with, in addition to the firms already coöperating with the school, the Proctor and Gamble Company, Port Ivory, Staten Island, and the Singer Manufacturing Company of Elizabethport, New Jersey.

Northeastern University.—New appointments:

Warren Goddard has been appointed Assistant Professor of Physics. Stuard F. Heinritz has been appointed Assistant Professor of English. Holley S. Winkfield has been appointed Assistant Professor of Electrical Engineering. Rufus H. Bond has been appointed Instructor in Mathematics. He is a teacher coach and will have charge of the coaching of basketball and baseball. Charles C. Russell has been appointed Instructor in Electrical Engineering. George W. Towle has been appointed Assistant Director of Engineering Practice. Eliot F. Tozer has been appointed Instructor in Drawing.

University of Oklahoma.—Professor L. C. Lichty, of the Department of Mechanical Engineering, is on his sabbatical leave of absence taking graduate work and assisting in the Mechanical Engineering Department of the Sheffield Scientific School, Yale University. Mr. Loyal Holland, one of our

graduates of five years' experience in the oil fields, is returning to do some graduate work and to assist in the Mechanical Engineering Department while Professor Lichty is away. Mr. C. R. Sandifer of Albert Lea, Minnesota, has been appointed Associate Professor of Civil Engineering.

Purdue University.—E. L. Erikson has been appointed Associate Professor of Structural Engineering. John L. Bray was appointed Assistant Professor of Chemical Engineering. C. S. Cutshall was appointed Instructor in Applied Mechanics. M. W. Todd was appointed Instructor in Civil Engineering. C. F. Bowman was appointed Instructor in Electrical Engineering. M. J. Zucrow was appointed Assistant in the Engineering Experiment Station. A. C. Benkleman and E. Gustafsen have been stationed at the Purdue Engineering Experiment Station by the United States Bureau of Public Roads to assist in the coöperative researches which are being carried on jointly by the United States Bureau of Public Roads and the Purdue Engineering Experiment Station.

Plans have been completed for a new power plant for Purdue University which will include opportunities for research work in Power Plant Engineering.

Plans have been completed for a new electrical engineering building and it is expected that the contract for this building will be closed some time this fall.

W. K. Hatt, for the past two years Director of Highway Research for the National Research Council, has returned to Purdue University to resume his position as Head of the School of Civil Engineering. During his absence R. B. Wiley, Professor of Sanitary Engineering, held the position of Acting Head of the School of Civil Engineering.

Worcester Polytechnic Institute.—Ira N. Hollis, President since 1913, has resigned and the Corporation has Appointed a committee of six, consisting of Paul B. Morgan, of the Morgan Construction Company, Worcester, Massachusetts, Aldus C. Higgins, of the Norton Company, Worcester, Massachu-

setts, Moses B. Kaven, Clifton H. Dwinnell, Everett J. Lake, and John W. Burke, to recommend a candidate, or candidates, for the Presidency of the Worcester Polytechnic Institute at the meeting of the Trustees on February 9, 1924. President Hollis has asked the Board to relieve him of his duties by July 1, 1924.

SOCIETY NOTES.

C. R. Mann, Director of the American Council on Education, will represent the Society at the inauguration of William Mather Lewis as President of George Washington University on November 7.

A. S. Langsdorf, Industrial Engineer with the Crunden Martin Mfg. Co., and former Dean of the Schools of Engineering and Architecture, Washington University, will represent the Society at the inauguration of Herbert Spencer Hadley as Chancellor of Washington University on November 10.

NEW MEMBERS.

DUNKLE, RALPH, Instructor of Engineering Drawing, The Ohio State University Columbus, O.

GOTTSBERGER, B. BRITTON, Professor of Mining, Yale University, New Haven, Conn.

MACLEAN, EDWARD A., Assistant Professor of Civil Engineering, South Dakota State School of Mines, Rapid City, S. D.

MOLITOR, FRED WM., Teacher of Vocational Electricity, Arsenal Technical Schools, Indianapolis, Ind.

SACKETT, ROBERT L., Dean of Engineering, The Pennsylvania State College, State College, Pa.

STOUGHTON, BRADLEY, Professor and Head, Dept, of Metallurgy, Lehigh University, Bethlehem, Pa.

WEIGEL, PAUL, Acting Head, Department of Architecture, Kansas State Agricultural College, Manhattan, Kans.

WEST G. ALVIN, Training Assistant, United States Veteran Bureau, Port Deposit, Md.

WHITE, LEON V., Assistant Professor of Civil Engineering, Kansas State Agricultural College, Manhattan, Kans.

SCHOOL OF ENGINEERING AND MINING, UNIVERSITY OF WESTERN AUSTRALIA, Perth, Western Australia. H. I. Whitfield, Dean.

NORTH CAROLINA SECTION. W. H. Browne, Chairman; G. M. Braune, Vice-Chairman; D. C. Jackson, Jr., Secretary; W. H. Hall, Treasurer.

APPLICANTS FOR MEMBERSHIP.

CURTIS, HARRY A., Professor of Chemical Engineering, Yale University, New Haven, Conn. C. F. Scott and G. F. Wittig.

FULTON, CHARLES H., Director, Missouri School of Mines and Metallurgy, Rolla, Mo. P. F. Walker and C. M. Young.

GRACEY, FRANK M., Instructor in Engineering Drawing, Yale University, New Haven, Conn. C. F. Scott and Richard S. Kirby.

HART, SIMEON T., Professor of Industrial Engineering, Syracuse University, Syracuse, N. Y. Louis Mitchell and S. D. Sarason.

SMITH, ALPHEUS W., Professor of Physics, The Ohio State University, Columbus, O. Frederic C. Blake and E. A. Hitchcock.